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Intramyocardial course of the coronary arteries in the marsh deer (*Blastocerus dichotomus*)

Trajetória intramiocárdica das artérias coronárias no cervo-do-pantanal (*Blastocerus dichotomus*)

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SUMMARY

The course of the coronary arteries was studied in marsh deers for comparison with domestic ruminants. The left coronary artery is originated from the aorta in the cardiac auricular surface and divides into paraconal and circumflex branches, which fit the paraconal interventricular sulcus and the subsinuous sulcus, respectively; this artery also gives off a branch to the conus arteriosus just before penetrating the myocardium. The right coronary artery arises from the aorta, in the heart cranial border and ends in this border, close to the subsinuous interventricular sulcus, perhaps without fitting it.

KEY-WORDS: Marsh deer. *Blastocerus dichotomus*. Coronary arteries.

INTRODUCTION

In domestic animals and humans, the coronary arteries and their main branches usually lie on the surface of the myocardium. However, they might be found inside the heart muscle in some parts of their trajectories, what is denominated myocardial bridging (Bezerra³).

Berg² noticed the trajectory of the coronary arteries as subepycardial in six orders and 61 species, relating the myocardial bridges to be rare and short, with no description about the exact number of them.

Schwarze and Schröder¹², Nickel et al.⁹ and Ghoshal⁶ did not make allusion to myocardial bridging in animals. They just described aspects related to the main branches, branching and distribution of the coronary arteries.

Hadzielimovic et al.⁷, in research using ten sheep hearts, related that nine of them had myocardial bridging; in the other one, the left coronary artery presented intramyocardial course in its left interventricular branch.

Bezerra⁴ related that myocardial bridges fill one fourth of the length of the paraconal interventricular branch in camels (*Camelus dromedarius*), and the right coronary artery did not present bridges.

Severino¹³ indicated a 94 % frequency of hearts with myocardial bridging in bovines. The bridges varied from one to seven in each heart, mainly in branches of the left coronary artery. In goats, Machado et al.⁸ noticed that, in

94,59 % of the cases, at least one myocardial bridge occurred, but only in the left coronary artery. Multiple myocardial bridges were observed in 71,42 % of the hearts.

Franck⁵ related that human myocardial bridges are an ordinary anatomical variation, in which a short myocardial segment overlaps the coronary artery, what might cause several degrees of systolic blocks.

Arnau Vives et al.¹ considered that myocardial bridges are constituted by muscled fibers overlapping an epycardial coronary artery in variable length. They are commonly found in humans and, although are usually associated with a benign prognostic, they are not related to clinical signs and are randomly found. Their presence can also be associated to cause angina.

Santos et al.¹¹ described a 100% incidence of single myocardial bridges and a 93.33% incidence of multiple heart bridges, varying from two to six, in bovines of the Canchim race.

Myocardial bridges are structures with variable shape and occurrence, studied in several species to provide better comprehension of physiological aspects. This actual research was focused on the vascularization and topography of the marsh deer heart, the biggest Brazilian deer.

MATERIAL AND METHOD

Six hearts of marsh deers, which died during

quarantine period, were obtained from the Marsh Deer Project held in Porto Primavera (São Paulo, Brazil) and used in this research.

The hearts were separated from the lungs and rinsed in water so that the excess of blood could be taken out from the cardiac chambers. The right and left coronary arteries were cannulated and colored latex was injected. Ligatures were made on these vessels and the hearts were set in a 20 % formalin solution for, at least, three days. After this time, they were dissected and photographs were taken for documentation.

RESULTS

In the marsh deer, the left and right coronary arteries were originated, in all analyzed hearts, from the aorta: the left one was originated in the auricular surface and the right one in the cranial border of the heart. Myocardial bridges were not found.

During their courses in the left and right interventricular grooves, the paraconal and the subsinuous branches went deep inside the myocardium and did not emerge in their path left. It was also noticed the continuation of the circumflex branch from the left coronary artery (figs. 1 and 2). The length and the diameter of the paraconal branch and the right coronary artery before penetrating the myocardium are indicated in table 1.

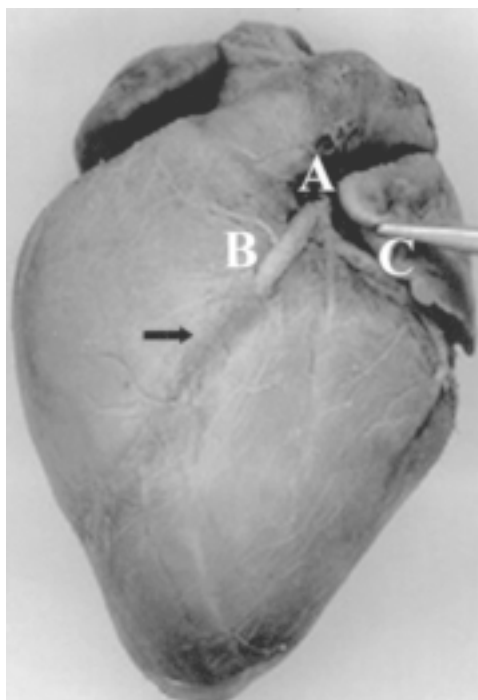


Figure 1

Photograph of the auricular surface of the heart of an adult marsh deer indicating the left coronary artery (A), the paraconal branch (B), the circumflex branch of the left coronary artery (C) and the intramyocardial aspect of the paraconal branch (arrow).

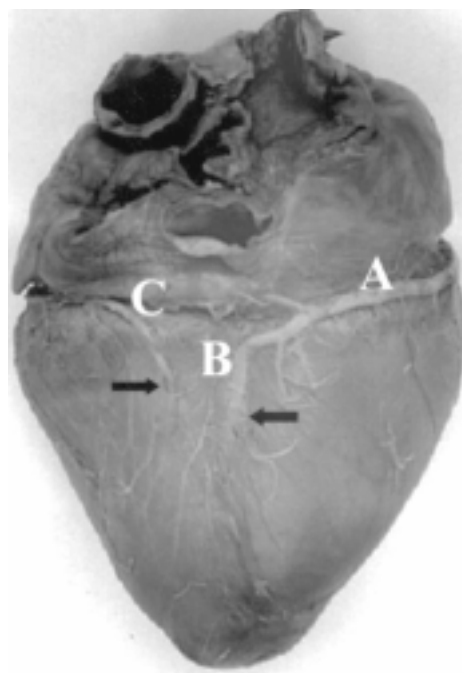


Figure 2

Photograph of the atrial surface of the heart of an adult marsh deer indicating the circumflex branch of the right coronary artery (A) continuing as subsinuous branch (B) and its intramyocardial situation (arrow). The circumflex branch of the left coronary artery (C) also presents intramyocardial situation (arrow).

DISCUSSION

The origins of the left and right coronary arteries in marsh deers were similar to those described by Schwarze and Schröder¹², Nickel et al.⁹ and Ghoshal⁶ in domestic ruminants: the left coronary artery arose from the aorta, in the auricular surface and the right coronary artery, in the cranial border of the heart.

The paraconal and subsinuous branches that went deep inside the myocardium did not emerge in their trajectory left, similarly to the ones noticed by Hadzielimovic et al.⁷ in ovines, which related an intramyocardial situation of the paraconal and the subsinuous branches in 10 % of the cases. Myocardial bridges in marsh deers were not found as those of Bezerra³, Franck⁵ and Arnau Vives et al.¹ in humans or Machado et al.⁸ in goats and Santos et al.¹¹ in bovines, which described muscle fibers overlapping an epicardial coronary artery in variable length, occurring the immersion and emergence of this artery in the myocardium.

The marsh deer is an animal with an enormous capacity of running away from its predators and predation in its natural populations is low. Escapes certainly require a

great cardiopulmonary capacity and it is likely that the morphological aspects of the marsh deer heart have influence in this capacity (Piovezan et al.¹⁰). Researches on other species are required to improve morphological data for a better discussion about this subject.

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RESUMO

O trajeto das artérias coronárias foi estudado no cervo-do-pantanal para comparação com os ruminantes domésticos. A artéria coronária esquerda se origina na aorta, na superfície auricular cardíaca e divide-se em ramos paraconal e circunflexo, os quais preenchem o sulco paraconal interventricular e sulco subsinuoso, respectivamente; esta artéria também origina um ramo para o conus arteriosus imediatamente antes de entrar no miocárdio. A artéria coronária direita surge da aorta, na borda cranial cardíaca e termina nesta borda, próximo ao sulco subsinuoso interventricular, entretanto, sem preenche-lo.

PALAVRAS-CHAVE: Cervo-do-pantanal, *Blastocerus dichotomus*, Artérias coronárias.

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